

**B.Sc. DEGREE PROGRAMME**  
**MATHEMATICS (CORE COURSE)**  
**FOURTH SEMESTER**

**MM4B04 : CALCULUS AND ANALYTIC GEOMETRY**

**5 hours/week**

**4 credits**

**30 weightage**

**Text Book**

Thomas & Finney : Calculus, 9<sup>th</sup> ed., LPE, Pearson Education.

**Module I : Transcendental functions (15 hrs)**

- 6.2 Natural logarithms
- 6.3 The Exponential function
- 6.4  $a^x$  and  $\log_a x$
- 6.5 Growth and decay (quick review)
- 6.6 L'Hopital's Rule
- 6.7 Relative rates of growth
- 6.10 Hyperbolic functions

**Module II – Infinite Series (25 hrs)**

- 8.1 Limits of sequence of numbers.
- 8.2 Theorems for calculating limits of sequences.
- 8.4 Infinite series
- 8.4 Integral test for series of non-negative terms
- 8.5 Comparison test for series of non negative terms
- 8.6 Ratio and root test for series of non negative terms
- 8.7 Alternating series, Absolute and conditional convergence

**Module III (15 hrs)**

- 8.8 Power series
- 8.9 Taylor and Maclaurin's series
- 8.10 Convergence of Taylor series  
Error estimate

**Module IV (35 hrs)**

- 9.1 Conic section and quadratic equations

- 9.2 Classifying conic section by eccentricity
- 9.3 Quadratic equations and rotations
- 9.4 Parametrisation of plane curves
- 9.5 Calculus with parametrised curves
- 9.6 Polar coordinates
- 9.7 Graphing in polar co-ordinates
- 9.8 Polar equations for conic sections
- 9.9 Integration in polar coordinates.

### **References**

Anton : Calculus, Wiley.

S.K. Stein : Calculus and Analytic Geometry, McGraw Hill.

### **Seminar topics**

Reduction formula – for integration.

Transformations of equations – Reciprocal equations, Descartes' rule of signs, Sturm's theorem.

Application of power series (8.11)